TABLE NO | | |

STUDENT ID NO | | | | | | | | | | |

MULTIMEDIA UNIVERSITY

SUBJECT CODE _____

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017/2018

TSE3351/TSE3571 – SOFTWARE EVOLUTION AND MAINTENANCE

(All sections / Groups)

23 OCTOBER 2017
9:00 am – 11:00 am
(2 Hours)

Question	Mark
A	
B	
C	
D	
Total	

Examiner 1 Signature: _____

Examiner 2 Signature: _____

Examiner 3 Signature: _____

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 10 printed pages (including cover page) with 4 Sections only.

2. Attempt **ALL** questions in **SECTION A, SECTION B, SECTION C and SECTION D**. The distribution of the marks for each question is given.

3. Please write all your answers **CLEARLY** in the specific answer box provided for each question. Submit this question paper at the end of the examination.

Attempt ALL questions in SECTION A, B, C and D.

Section A (12.5 marks)

Consider a software system using flying unmanned aerial vehicles (UAVs) to deliver commercial goods to consumers. We expect the UAVs to behave as described in their specifications. For example, we assume that "The Model-X drone is able to transmit messages at distances up to 1,000 meters," as specified by its manufacturer. So, we write the safety specification, "The UAV must remain within 900 meters of a ground control station at all times." This minimizes the likelihood of accidents associated with the lack of direct UAV control.

Based on the above scenario, answer the following questions Q-A1 to Q-A3:

A1. List FOUR factors that bear on usefulness of unmanned aerial vehicles (UAV) software system. Explain why the software system that is used in a real-world environment must change.

(2 + 1 marks)

Continued...

A2. What does software maintenance concerned with? Explain TWO reasons why is software maintenance important to the unmanned aerial vehicles (UAV) system?

(1 + 3 marks)

Continued...

A3. A software maintenance framework consists of SIX components: User environment, Organizational environment, Maintenance, Process & Personnel, Software, and Operational environment.

A3(a) Draw the software maintenance framework showing the relationship between the SIX components, applicable to the UAV system.

(4 marks)

A3(b) These components interact with each other based on THREE types of relationships. List the THREE types of relationships.

(1.5 marks)

Continued...

Section B (12.5 marks)

Building Information Modeling Security (BIM-Sec) system is a software tool that support the access control of cyber-physical spaces, such as smart buildings. Using this system, security analysts can use to visualize and edit a building's topological characteristics and verify whether access-control policies satisfy the security requirements imposed on reachability relationships—for example, to verify whether an individual can reach a specific asset or building area. If verification fails, the tool provides guidance on how to revise access-control policies for the current topological configuration. The representation of a building's topological characteristics is tailored to meet security analysts' needs with a representation of a building cyberspace, omitting those details of the physical building that are likely to be irrelevant for security analysts.

Based on the above scenario, answer the following questions Q-B1 to Q-B5:

B1. Draw the generic life cycle for software production process, which contains FIVE stages in the evolution of the abovementioned BIM-Sec system.

(3 marks)

B2. What are the THREE components of a process when maintaining the BIM-Sec system? Why do we need to perform the BIM-Sec software production process?

(1.5 + 0.5 marks)

Continued...

B3. You are appointed as the software maintainer of this system. Describe the FOUR categories where software maintenance can be categorized.

(4 marks)

B4. Code-and-Fix model is a simple 2-phases model. Explain the TWO weakneses of Code-and-Fix model when applied to the above BIM-Sec system.

(1 + 1 marks)

B5. Knowing the weaknesses, why do we still use Code-and-Fix model for the BIM-Sec system? How do we use Code-and-Fix model with other larger model?

(1 + 0.5 marks)

Continued...

Section C (12.5 marks)

The current generation of Internet of Things (IoT) on big data software systems (such as smart supply chain management, and smart energy grids) combines multiple independent data analytics models, historical data repositories, and real-time data-streams that are likely to be available across geographically distributed data centers (both private and public). Similarly, health-care IoT software systems require churning through massive amounts of heterogeneous, real-time information available from social media, emergency rooms, health departments, hospitals, and ambulatory care sites to detect outbreaks of deadly diseases such as MERS and dengue fever.

C1. Discuss how developers make use of two classes of RationaleNode and ModelElement in developing the abovementioned IoT software system. These classes can be found in a typical functionality implementation. Subsequently, draw a class diagram to support your answer.

(3 + 3 marks)

Continued...

C2. Explain how the Source Code Control System (SCCS) can be used as part of software maintenance for the above IoT software system.

(2 marks)

C3. Based on the scenario above, explain the limitations of SCCS in relation to its use in a parallel development/maintenance environment and explain how these limitations can be overcome in other support tools.

(4.5 marks)

Continued .....

Section D (12.5 marks)

Consider an autonomous driving system, which demands highly interactive services with multi-sensor capability — far from the currently deployed functionally isolated control units. Note that 'autonomous' means the ability of a car to perform driving and make decisions without help from anyone else. Connectivity within this system is transforming cars into distributed IT (Information Technology) systems with cloud access; over-the-air (OTA) functional upgrades; and high-bandwidth access to map services, other vehicles, and the surrounding infrastructure.

D1. What are the FOUR factors that provide motivation for maintaining the above software?

(2 marks)

D2. What is software maintenance? Explain THREE purposes of the software maintenance tools for abovementioned scenario.

(2 marks)

Continued...

D3. Explain the FIVE guidelines in producing a good autonomous software documentation.

(5 marks)

D4. Provide SEVEN benefits that can be derived from the above autonomous software reuse.

(3.5 marks)

End of Paper